Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Score /90

**The Human Genome Unit Test: Answer Key**

**Multiple Choice:** Circle the answer that best completes each question. Each question is worth 3 points.

1. In a normal human there are.... (1 or 2)

a) 44 autosomes c) 46 chromosomes

b) 23 chromosomes d) A and B

2. The term that describes traits controlled by many genes. (10)

a) polygenic c) monogenic

b) polytraits d) monotraits

3. When two different alleles are present and both are expressed in the phenotype. (5)

a) recessive c) codominance

b) dominance d) none of the above

4. A person who produces type A antigen has which blood type? (6)

a) Type A c) Type B

b) Type AB d) Type O

5. Phenylketonuria refers to (18)

a) A genetic disease caused by recessive alleles

b) Lack of a proper enzyme to break down the sugar found in milk

c) If not diagnosed will cause severe mental retardation

d) A and C

e) All of the above

6. The average human gene contains about how many base pairs? (2)

a) 5000 c) 3000

b) 1498 d) 65

7. The genetic disorder associated with trisomy of chromosome 21 is known as? (11)

a) Klinefelter’s Syndrome c) Turner’s Syndrome

b) ALS (Lou Gehrig’s Disease) d) Down Syndrome

8. The process of changing a gene that causes a genetic disorder in an attempt to treat that disease is known as? (16)

a) Gene therapy c) Gene splicing

b) Genetic modification d) Genetic engineering

9. Klinefelter’s Syndrome refers to (13 or 14)

a) Males born with extra copies of the X chromosome

b) Females born with only one copy of the X chromosome

c) Sterility

d) B and C

e) A and C

10. The presence of an allele that suppresses the expression of another allele. (5)

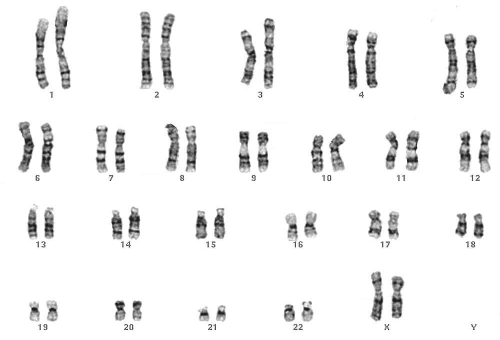
a) Dominance c) Codominance

b) Recessive d) None of the above

**True or False:** Circle either true or false for the following questions. Each question is worth 3 points.

11. (True/False) If the gene that controls the color of spots is located on the X chromosome, a cat which is mostly white but with black and orange spots would be a female. (12)

12. (True/False) The image below shows a normal, healthy human male. (3 and 4)



13. (True/False) All traits are controlled by genes only. (10)

14. (True/False) Huntington’s disease is associated with recessive alleles. (13 and 19)

15. (True/False) A person with type A and B antibodies in their blood would have the AB blood type. (6)

16. (True/False) A “turned-off,” highly densely compacted X chromosome is commonly known as Lou Gehrig’s disease. (12)

17. (True/False) A female born with only one copy of chromosome X would develop Turner’s Syndrome. (13 and 15)

18. (True/False) The presence of the Y chromosome makes the developing fetus a male. (2)

**Short Answer:** Write a brief answer to each question below

Jimmy is born with a rare blood type, type O. Both his mom and his dad have type B blood, how is it possible Jimmy is born with type O? Also identify any benefit of having type O blood, if there are any benefits. This question is worth 5 points. (6)

**Both of Jimmy’s parents are carriers for type O blood. Type O blood can be given to anybody.**

Even though sickle-cell disease is detrimental for human health why do we see such high rates for the sickle-cell gene in Africa? This question is worth 6 points. (8 and 9)

**If you have one gene for sickle-cell and one normal gene you are resistant to malaria. In Africa there are high rates of malaria meaning the heterozygote (codominate) phenotype is most successful.**

If you could cure Down syndrome patients, how would you do it and in what stage of life would you use your treatment? This question is worth 6 points. (17)

**I will accept anything along the lines that explains how you must remove the extra copy of chromosome 21 at a young age before the child has a chance to develop. Ideally I would want them to say the extra copy must be removed will the zygote is still developing.**

What is nondisjuction? This question is worth 3 points. (20)

**When homologous chromosomes fail to separate.**

**Essay:** Write a response to the follow prompt. This question is worth 15 points.

First, identify the reasons why humans want to study (and manipulate) our genes. Next, decide if each one of these reasons is a good thing or a bad thing. Finally, choose a side on whether or not humans should attempt to alter our genes and provide specific reasons for your decision as discussed in class. **Note**: there is no right or wrong answer to the second half of this question. You will be graded on how well you identified the pros and cons of genetic research and how well you defended your answer. Be sure to use logical, thought out answers in your responses. (22)

**Treatment of disease, the ability to alter phenotypes, and the ability to understand the nature of human beings are all good reasons why humans what to study and manipulate our genes. The latter half of this question is up to the student and will be graded on how well they defend their answer. To receive full points they must identify all reasons why we study our genes and provide a well thought reason why certain aspects of studying genes are good or bad.**